Background

Sutter Tracy Community Hospital (STCH) is a non-profit 79-bed acute care hospital located in Northern California serving more than 100,000 people in the Central Valley region. In 2015, the STCH Antimicrobial Stewardship Program (ASP) established a multidisciplinary committee under the leadership of a consultant ASP Physician and an ASP certified Pharmacist to coordinate stewardship efforts and support implementation of new initiatives.

Introduction

Carbapenems have broad spectrum activity against Gram-positive and Gram-negative bacteria, including organisms producing Extended Spectrum Beta-Lactamases (ESBL). Unrestricted use and overuse of these agents leads to limited susceptibility profiles and reduced treatment options. STCH’s Antimicrobial Stewardship Committee noted imipenem-clastatin as the antipseudomonal beta-lactam with the lowest susceptibility to Pseudomonas aeruginosa (88%) and a concerning trend (82%) in 2013.

Objectives

• To decrease overall carbapenem use by improving prescribing habits and promoting the appropriate use of these antibiotics

Methods

Intervention:

• A Carbapenem Prescribing Algorithm (Figure 1) was developed as guidance for physicians to promote the appropriate use of carbapenems.
• Pharmacists utilized prospective audit and feedback for new orders that failed to meet the algorithm’s use criteria and recommended alternative therapy.

Design:

A quasi-experimental study was conducted utilizing a four-part medication use evaluation (MUE) consisting of a three month retrospective pre-intervention baseline followed by three post-intervention periods:
• Pre-intervention
  • Part 1: January – March 2015
  • Intervention
  • Implementation: December 2015
  • Part 2 (immediate post-intervention): January – March 2016
  • Part 3 (six months post-intervention): July – September 2016
  • Part 4 (one year post-intervention): January – March 2017

End Points:

• Number of patients who received a carbapenem
• Percent of patients who met algorithm use criteria
• Carbapenem days of therapy adjusted per 1000 patient-days (DOT)
• Cost savings using pharmacy purchasing data

Results

Table 1. Days of Therapy

<table>
<thead>
<tr>
<th></th>
<th>Part 1</th>
<th>Part 2</th>
<th>Part 3 (6 mo Post)</th>
<th>Part 4 (1 yr Post)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbapenems</td>
<td>131.8</td>
<td>40.2</td>
<td>42.9</td>
<td>64.5</td>
</tr>
<tr>
<td>Cephalosporins</td>
<td>318.4</td>
<td>391.3</td>
<td>395.6</td>
<td>411.3</td>
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<tr>
<td>Beta-lactam</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lactamase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inhibitors</td>
<td>155.2</td>
<td>60.1</td>
<td>113.5</td>
<td>236.3</td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td>171.1</td>
<td>174.8</td>
<td>169.2</td>
<td>151.4</td>
</tr>
</tbody>
</table>

• A three-fold decrease in DOT was observed from baseline to immediately post-intervention and remained low six months later.
• Although DOT increased one year post-intervention, it still remained ~50% lower than baseline.
• Cephalosporins and beta-lactam/β-lactamase inhibitors were predominantly used in place of carbapenems as seen by their ~86% of overall use.

Results (continued)

Figure 2. Number of Patients Who Received a Carbapenem and Percent of Patients Meeting Use Criteria

January 2015 to March 2017

• Overall reduction in carbapenem use improved susceptibility to P. aeruginosa (Figure 3).

Conclusions

• The implementation of a Pharmacy-driven Carbapenem Prescribing Algorithm at a small community hospital improved prescribing habits and the appropriate use of these agents.
• This intervention also led to a three-fold reduction in overall carbapenem use and cost savings for the hospital.
• Success with the algorithm continued six months and one year post-intervention.
• Although carbapenem utilization increased one year post-intervention, it is important to note that 79% of this use was deemed appropriate based on algorithm criteria.

References


Acknowledgements

We would like to acknowledge the Sutter Tracy Community Hospital Antimicrobial Stewardship Committee and the pharmacy department for implementing the Carbapenem Prescribing Algorithm and Dr. Pravena Sarris for supporting the success of our ASP.

Figure 1. Carbapenem Prescribing Algorithm